2023 MID-ATLANTIC CONFERENCE

11th ANNUAL CURRENT CONCEPTS IN

VASCULAR THERAPIES

2023

Hilton Virginia Beach Oceanfront
Virginia Beach, Virginia

APRIL 20-22

2023 MID-ATLANTIC CONFERENCE

11th ANNUAL CURRENT CONCEPTS IN

VASCULAR THERAPIES

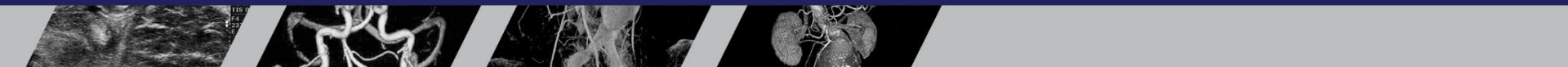
2023

I Was Just Told I Have an Aortic Aneurysm: What Should I Expect?

Epidemiology, Growth Rates and Patient Perspective of AAA

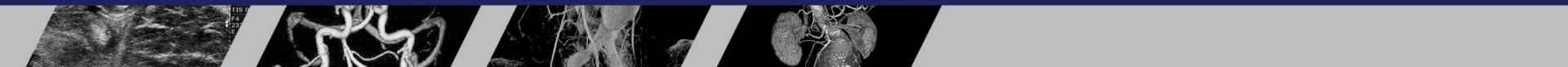
What should I expect?

- What should “I” expect or what should the patient expect?
- The reason I raise the question is because both parties are generally meeting for the first time and reactions from patients vary greatly from as something as simple as:
    - "What is an aneurysm"?
    - "When I am I going to die"?
- As such, it is extremely important to prepare for office visits when meeting a patient with an aneurysm - or any problem for that matter.



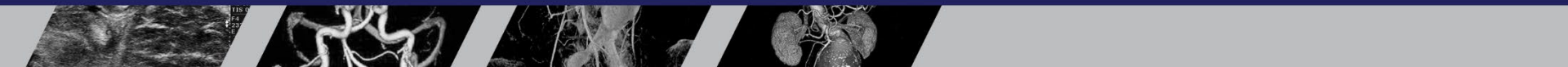
Tips to new (all) providers

- Be prepared for the office visit
- Review imaging and patient information prior to visit
- Be confident in your recommendations
- Individualize treatment
- Educate the patient



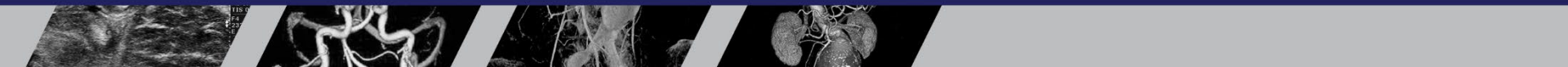
Attempt to allay fears

- 9 out of 10 patients will not be offered surgery
  - “Please relax and let’s have a nice visit because we are not going to talk about surgery. I am going to get to know you and discuss your aneurysm with you and how we are going to keep track of it".
- In other words, “There’s good news for you and bad news for me”.
  - The good news for you is that you do not require the services of a vascular surgeon.
  - The bad news for me is that you do not require the services of a vascular surgeon.
- For the 1 out of 10 patients who show up with an aneurysm that is large enough to consider repair:
  - How fortunate they are to know about the aneurysm and to have time to discuss treatment options.



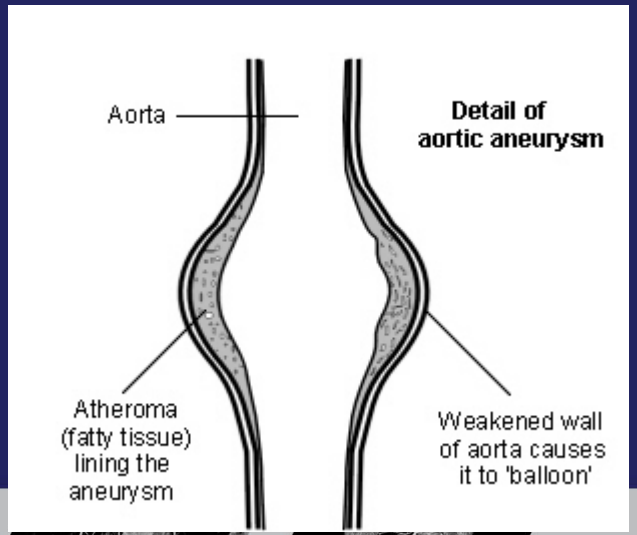
What is an aneurysm?

- Definition
- Location
- Review imaging together
- Further testing
- Size



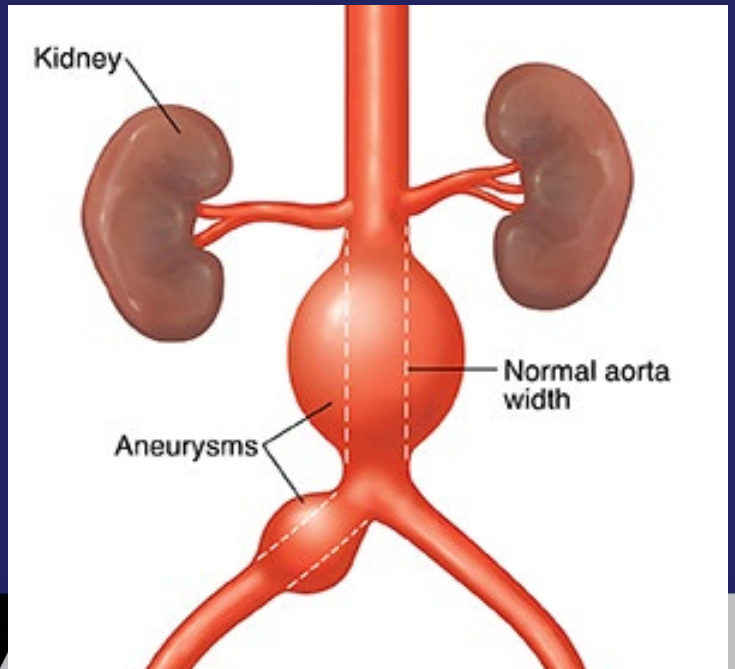
Abdominal aortic aneurysm (AAA) - definition

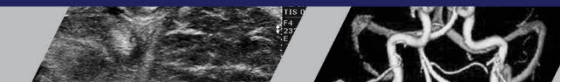
- An abdominal aortic aneurysm (AAA) is defined as an aortic diameter at least one and one-half times the normal diameter at the level of the renal arteries, which is approximately 2.0 cm.
- Thus, generally, a segment of abdominal aorta with a diameter of greater than 3.0 cm is considered an aortic aneurysm



Abdominal aortic aneurysm-location

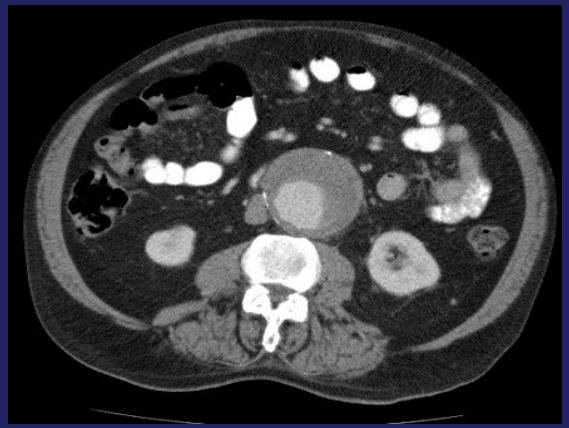
- For the sake of this presentation I am focusing on infrarenal AAA.
- Aneurysm arises below the renal arteries
- Concomitant iliac aneurysm formation is not uncommon

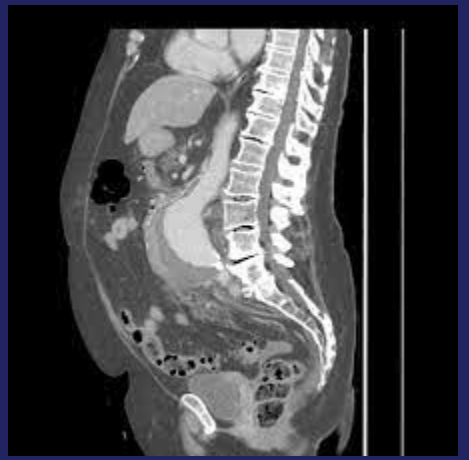




Abdominal aortic aneurysm-imaging/further testing

- Almost all aneurysms are incidentally discovered because they are generally a challenging to palpate on physical exam





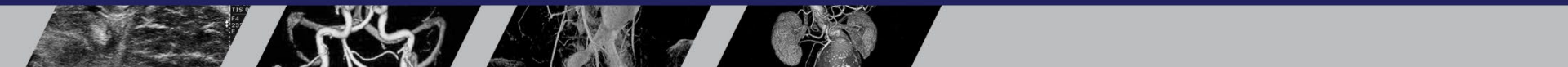
- If ultrasound only at presentation patient should have a CT scan to further delineate the size of the aneurysm and to rule out concomitant iliac aneurysm disease

Abdominal aortic aneurysm-size

- Almost all patients want to know the size of the aneurysm because the size of the aneurysm has significant bearing on treatment recommendations
  - Risk for aneurysm rupture
  - Do I need surgery?
  - What kind of follow-up do I need?

Risk for rupture?

- The prediction of rupture risk is extremely complicated
  - Relates to multiple factors well beyond the size of the aneurysm.
- Current clinical assessment methods to evaluate AAA rupture potential are unreliable.
  - In general, an enlarging AAA is accompanied by both an increase in wall stress and a decrease in wall strength
  - Both parameters are critical and need to be taken into account, as aneurysm rupture occurs when the former exceeds the latter.
- Many point to the Law of Laplace as the theoretical basis for using the “maximum diameter criterion” for AAA rupture potential prediction.
  - “Law” states that the stress in the AAA wall is proportional to its diameter.
- There are multiple mathematical models on which aneurysm rupture may be predicted. However, the Law of Laplace is not the best of them

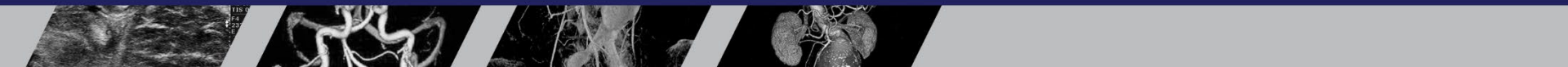


Risk for rupture?

- The sole use of the Law of Laplace to predict AAA rupture potential is erroneous thinking for two reasons. First, the AAA wall geometry is not a simple cylinder or sphere with a single radius of curvature, for which the Law of Laplace is valid.

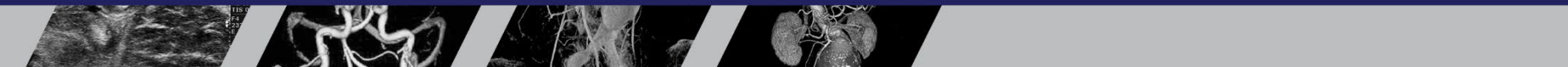
- Rather, the AAA wall is complexly shaped with both major and minor wall curvatures. To use only the maximum diameter to predict wall stresses in AAA, therefore, misses the significant contributions of local complex wall surface shapes.

- Secondly, consideration of wall stress alone is not sufficient to predict AAA rupture. Material failure, including that accompanying AAA rupture, occurs when the mechanical stress acting on the material exceeds its strength. Therefore, the greater the stress:strength ratio for a particular aneurysm, the greater its likelihood of rupture. AAA diameter is not the only determinant of either wall strength or wall stress.



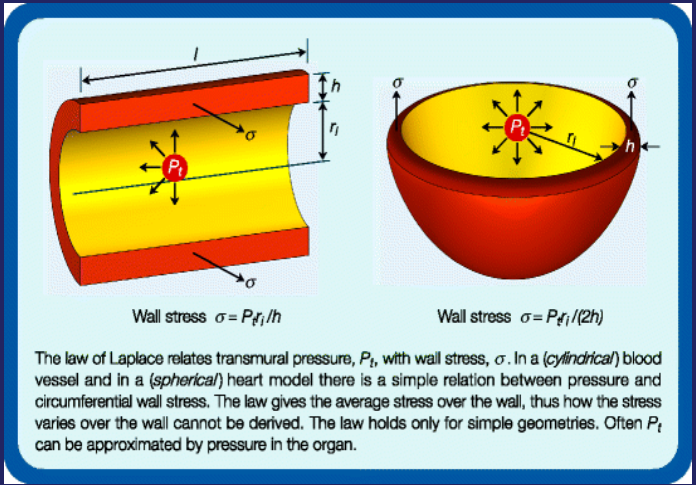
Risk for rupture?

- Furthermore, there are other factors that impact the strength of the aortic wall
- Smoking
  - Epidemiologically smoking is more often associated with aneurysm disease than it is with coronary disease. There is little doubt that smoking impacts the risk for aneurysm expansion/rupture.



Risk for rupture?

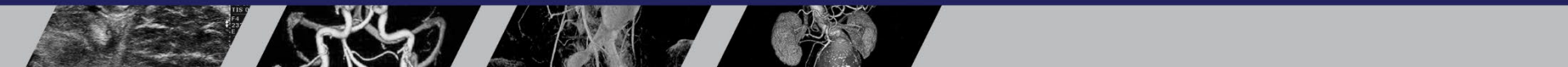
- However, at the end of the day do you want to be a biomechanical engineering/physics nerd



The law of Laplace relates transmural pressure, P_t, with wall stress, σ. In a (*cylindrical*) blood vessel and in a (*spherical*) heart model there is a simple relation between pressure and circumferential wall stress. The law gives the average stress over the wall, thus how the stress varies over the wall cannot be derived. The law holds only for simple geometries. Often P_t can be approximated by pressure in the organ.

$$\underline{\mathbf{T}} = -\mathrm{p}\underline{\mathbf{1}} + 2[\alpha + 2\beta\,(\mathrm{I}_1 - 3)]\underline{\mathbf{B}}$$

- Or do you want to give patients some recommendations.
- In most practices, rupture risk is assessed based on the "maximum diameter criterion"



Surgical intervention

- Undertaken when the risk of observation exceeds the risk of intervention

- In general, the discussion for aneurysm repair begins with a 5.5 cm aneurysm in a male and a 5.0 cm aneurysm in a female.
  - Smoking may increase the risk for rupture in both groups.

- However, it is very important to individualize treatment.
  - Advanced age
  - Significant medical morbidities
  - Cancer

- Smoking

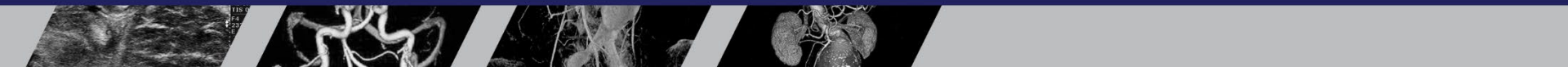
Follow-up

- There are no textbook answers

- I generally follow AAA in the following fashion:
  - <3.5 every other year with US
  - 3.6-4.5 cm yearly with ultrasound
  - 4.6-5.4 cm every 6 months with ultrasound

- For a young smoker, male or female, follow-up may vary

- For patients with limited life expectancy, I do not discuss surgical repair but often offer them serial follow-up with ultrasound imaging to allay fears of impending doom.

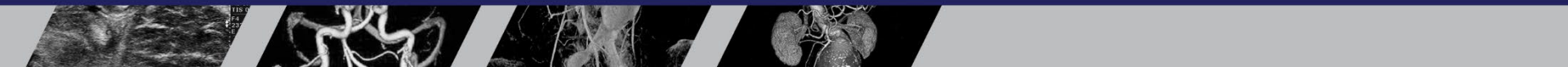


Recommendations to patients

- Do not join an aortic aneurysm support group
  - Unless you care to listen to others support you by telling you that their problem is worse than yours.

- Do not Google yourself
  - Unless you want to end up with crippling anxiety…and you will have to join an anxiety support group that will be 1,000 times worse than any aortic aneurysm support group.

- And please, for the love of God, try not to use My Chart to communicate with me.



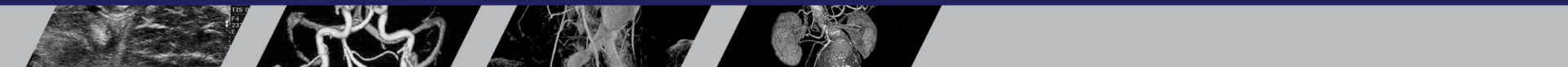
Recommendations to patients

- However, the most important recommendation is to go to the closest emergency room with any unusual abdominal or back pain.

- Call with any concerns or questions

- Patients with advanced age or significant medical morbidity should be counseled about the lack of utility of aneurysm repair for their specific cohort.
  - They should be counseled to have a very detailed discussion with family members regarding the fact that they have decided not to have an elective aneurysm repair and that they should never undergo an emergency aneurysm repair.

- Never forget to offer patients a referral for a second opinion

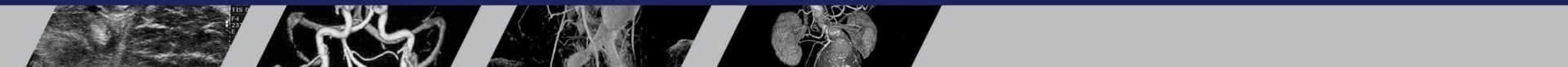


What can the patient control to reduce the risk for aneurysm expansion/rupture?

- Control hypertension
  - Severe hypertension is associated with increased aneurysm expansion

- Reduce heavy lifting
  - While counterintuitive, weight training actually lowers blood pressure long-term, but during exercise there can be significant spikes - avoid the spikes

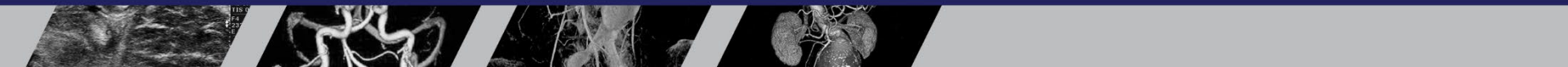
- Most importantly - quit smoking
  - Detailed smoking cessation discussions should be undertaken not only to reduce the risk for aneurysm growth/rupture, but to improve global cardiovascular morbidity/mortality.



Aneurysm surgery

- Of course, we discuss the technical aspects of open and/or endovascular aneurysm repair, and discuss the risks and benefits associated with each of them.

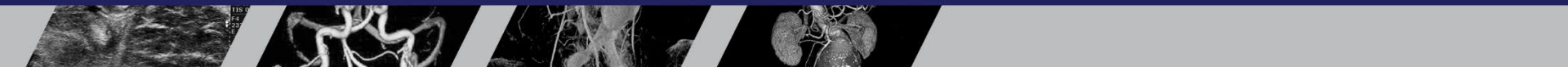
- However, just as important to offer patient realistic expectations
  - Hospital stay
  - Recovery
  - Postoperative restrictions



Aneurysm surgery – post op

Postoperative restrictions for the male patient (LIFE-LONG)

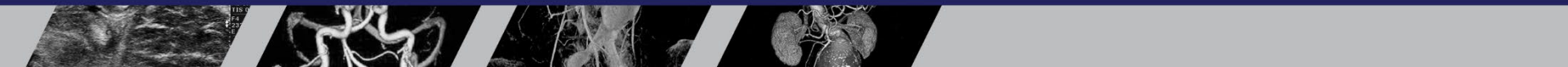
- No cooking
- No cleaning
- No laundry
- No dishes
- Never take out the trash
- Leave your clothes in a pile
- Never clear a table after a meal
- You should lay around and bark all orders like
  - “Bring me a beer”
  - “Hand me that remote control”



Aneurysm surgery – post op

Postoperative restrictions for the female patient

- None

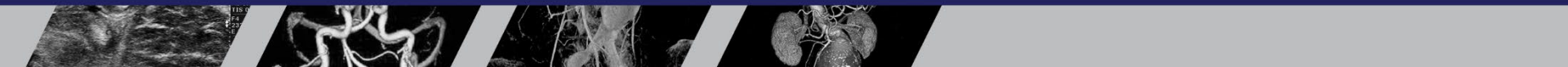


Aneurysm surgery – post op

Vary with the type of surgical procedure (not gender)

- Endovascular: Very limited restrictions.
  - Shower day 1, but do not soak in a bath or pool until instructed that you may do so
  - Remove dressings day 3
  - No driving for 5 days
  - Return to work when comfortable
  - Otherwise advance activity as tolerated

- Open aneurysm: Many postoperative restrictions
  - Shower at DC, but do not soak in a bath or pool until instructed that you may do so
  - Dressing probably removed prior to discharge
  - No driving for 2 weeks
  - No lifting greater than 25 pounds for 2 weeks, 50 pounds 6 weeks
  - Return to work to be determined



Summary - Patient Perspective of AAA

- High level of anxiety can be managed
  - Prepare for office visit
  - Minimizing fears/anxiety
  - Confident in recommendations
    - Second opinion
  - Manage expectations
  - Individualized treatment
  - Educate the patient